SECTOR COMPETITIVENESS FRAMEWORKS

PRIMARY STEEL

OVERVIEW AND PROSPECTS

Industry Sector
Metals and Minerals Processing

Secteur de l'industrie
Transformation des métaux et minéraux

Canada

PRIMARY STEEL

OVERVIEW AND PROSPECTS

PREPARED BY:
METALS AND MINERALS
PROCESSING BRANCH

This *Overview and Prospects* document on Primary Steel in the **Sector Competitiveness Frameworks** series was produced by Industry Canada in partnership with Canada's key stakeholders in the industry. Ongoing consultations with major industry stakeholders, following study and review of the *Overview and Prospects*, may lead to a follow-up *Framework for Action* document.

The **Sector Competitiveness Frameworks** series will focus on the opportunities, both domestic and international, as well as on the challenges facing each sector. The objective is to seek ways in which government and private industry together can strengthen Canada's competitiveness and, in doing so, generate jobs and growth.

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FOREWORD

The new Canadian marketplace is expanding from national to global horizons and its economic base is shifting increasingly from resources to knowledge. These trends are causing Canadian industries to readjust their business approaches, and government must respond with new tools to help them adapt and innovate. Industry Canada is moving forward with strategic information products and services in support of this industry reorientation. The goal is to aid the private sector in what it is best qualified to do — create jobs and growth.

Sector Competitiveness Frameworks are a series of studies published by Industry Canada to provide more focussed, timely and relevant expertise about businesses and industries. They identify sectors or subsectors having potential for increased exports and other opportunities leading to jobs and growth. In 1996–97, they will cover 29 of Canada's key manufacturing and service sectors.

While they deal with "nuts and bolts" issues affecting individual sectors, the Sector Competitiveness Frameworks also provide comprehensive analyses of policy issues cutting across all sectors. These issues include investment and financing, trade and export strategies, technological innovation and adaptation, human resources, the environment and sustainable development. A thorough understanding of how to capitalize on these issues is essential for a dynamic, job-creating economy.

Both government and the private sector must develop and perfect the ability to address competitive challenges and respond to opportunities. The Sector Competitiveness Frameworks illustrate how government and industry can commit to mutually beneficial goals and actions.

The Sector Competitiveness Frameworks include an initial *Overview and Prospects* document that profiles each sector in turn, examining trends and prospects. Consultations and input arising from industry–government collaboration may lead to a *Framework for Action* that identifies immediate to medium-term steps that both can take to improve sectoral competitiveness.

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1 HIGHLIGHTS

Canada's steel manufacturers are efficient and technically advanced competitors in a very demanding international market that has seen dramatic changes in recent years. They are major export earners for Canada, with practically all export shipments going to the United States.

Although there has been some government ownership in the sector in the past, the industry is now almost entirely owned by the private sector. It contributes a substantial part to Canada's wealth, as measured by gross domestic product (GDP). However, the share of GDP accounted for by the steel sector has fallen gradually over the past 10 years, in line with similar trends in other developed economies. This trend occurs mainly because most of the increase in steel consumption is by the newly industrialized nations that are creating the infrastructure of a modern economy. Conversely, most of the rapid growth in the advanced economies is concentrated in the telecommunications, information technology and service sectors of the economy, all of which are low in their use of steel.

Canada currently has 14 steel producers, based mainly in Ontario. Algoma, Dofasco and Stelco are the largest and produce close to three fifths of the total national output. They operate large integrated facilities equipped with blast furnaces and rolling mills. The smaller producers use electric arc furnaces (EAFs), which allow them to focus on carbon steel plate, sheet, bar and rod products as well as specialty steels and stainless steel products.

World Trade

There was no single dominant supplier in 1995, but producers in Asia (predominantly China, Japan, the Republic of Korea and Taiwan) accounted for over one third of global steel production. The European Union and the United States are also major suppliers — as is Russia, although its production has been cut in half since 1985.

Based on shipments, Canada ranked thirteenth largest steel producer in the world in 1995. It benefits from being located close to the U.S., which is one of the world's largest steel markets and a sophisticated steel user. This proximity has led the industry to supply a wide range of advanced steel products as well as to provide "just in time" deliveries across the United States. Canadian mills cannot generally compete profitably outside North America, transportation costs and non-tariff barriers being the main obstacles.

North American Trade

With over 90 percent of Canadian steel exports going to the U.S., access to that market is an important issue. In part because of the Canada–U.S. Free Trade Agreement (FTA) and then the North American Free Trade Agreement (NAFTA) among Canada, the U.S. and Mexico, Canadian steelmakers regard North America as an increasingly integrated market, one in which the resort to anti-dumping and countervailing duty actions to resolve allegations of unfair trade are inappropriate and unnecessary. Unfortunately, intergovernment discussions seeking to amend, if not eliminate, existing trade remedy legislation and procedures have not led to any progress in resolving this issue. Although the Canadian steel industry is disappointed with the lack of progress, it continues to press the government to pursue the matter with the appropriate Mexican and U.S. authorities. At the same time, in the absence of any change in the position of other NAFTA governments — particularly the U.S. — the industry is requesting the government to consider changes to Canadian trade remedy legislation and procedures to ensure that, in the interim, Canadian producers receive no less protection from unfairly traded products than their U.S. counterparts.

Technology and Innovation

Domestic producers have invested heavily in steelmaking equipment in recent years, and in some instances have adopted modern technology and processes ahead of their U.S. counterparts. They are now able to produce a range of steels, most of which did not exist seven years ago.

The Canadian Steel Industry Research Association (CSIRA), an association of steel companies, has been established to enhance the competitiveness of the Canadian steel industry by promoting the development of facilities for and expertise in iron and steel research. To this end, CSIRA helps stimulate research and teaching in steel technology at Canadian universities and government research laboratories.

1.1 Major Trends

Steel manufacture is no longer the exclusive preserve of industrialized nations. It is now produced in 56 countries, with high-quality producers appearing in the developing world. This has stimulated international trade in steel.

The market is expected to remain strong in the near term with improved North American demand for steel coupled with intense competition for this market from low-cost and/or government-subsidized offshore suppliers as well as from U.S., Canadian and Mexican producers. Looking further ahead, integrated mills can expect growing competition from EAF-based mini-mills, which have already lowered the capital cost barriers to steel industry entry and will soon be able to offer a much wider range of (flat) products than at present. In fact, industry observers expect to see the distinction between integrated and mini-mill operations become increasingly blurred in the years ahead. Also, the number of steps in the steelmaking process will continue to shrink, delivering lower costs with better yields and a more uniform product.

The automobile market is a major steel consumer in North America, but one in which steel has been displaced in some applications by plastic, aluminum, magnesium and carbon fibre components. The introduction of new high-strength, formable and more corrosion-resistant steels, however, has slowed this trend and, in some instances, has led to the recapture of a number of automobile applications from these other materials. This trend may well continue. Residential home construction is a new market that the industry is targeting, one that is seen to hold much potential both in Canada and the U.S. as well as in Mexico, Europe and Japan.

Investment

Canada's primary iron and steel industry invested $7.8 billion between 1980 and 1995 to reduce manufacturing costs and achieve higher product quality. With the return of the industry as a whole to profit in 1994–95, annual capital spending has almost doubled from its low point in the early 1990s. This investment is designed primarily to increase (or replace) steelmaking capacity and to upgrade finishing facilities.

Human Resources

Canadian steelmakers currently employ about 34 000 people, at average incomes substantially above the Canadian norm. The work force total was closer to 50 000 ten years ago, but with downsizing the industry has increased productivity levels, upgraded employee skills to handle increased automation in the production plants and helped create a much more competitive industry. Employers are planning to double their training budgets for the next three years to help introduce new work methods and to provide workers with the skills needed in this new environment. Changes that reduced layers of management and encouraged teamwork and employee empowerment have contributed to the industry's successful reorganization of its work practices.

Management–labour relations in the steel business have become increasingly progressive in recent years, leading to fewer work stoppages and improved operating efficiencies.

Environment

Emissions from Canadian steel mills have been significantly reduced in recent years. Further improvements are planned, particularly in curtailing the release of substances deemed to be toxic.

The continued efforts to improve the environmental performance of this industry will impact integrated mills more severely because of their coke ovens and blast furnaces. EAFs on the whole generate fewer direct environmental problems.

1.2 The Bottom Line

A number of issues are particularly important to the future of Canada's steel industry. These include:

- maintaining unimpeded access to the U.S. steel market
- ensuring that Canada is the NAFTA investment location of choice for steel
- meeting environmental responsibilities without adversely affecting the industry's competitiveness
- sustaining low interest rates to permit access to reasonably priced sources of capital
- removing interprovincial barriers to trade
- continuing to adapt to a customer-driven market.

2 KEY POINTS ABOUT THIS INDUSTRY

Canada's primary steel industry involves 14 firms in 6 provinces

The Canadian primary steel sector consists of 14 companies operating 17 facilities that melt and pour steel. The facilities are located in Alberta, Saskatchewan, Manitoba, Ontario, Quebec and Nova Scotia. They can be classified into three main industry segments: flat-rolled products (e.g. sheet steels), long products (e.g. concrete reinforcing bar and structural steel), and specialty and alloy steels (e.g. stainless steel and tool steels, in both long and flat products). Statistics Canada defines the sector for the purposes of compiling data according to its 1980 Standard Industrial Classification (SIC) under code 2919, Other Primary Steel Industries. The key features of the Canadian primary steel industry are profiled in Table 1.

Table 1. Canadian Steel Industry, 1995

Number of establishments	=	17
Value of shipments	=	$10.69 billion
Exports	=	$3.02 billion
Balance of trade	=	$350 million
Total assets	=	$12.55 billion
Corporate profits	=	$995 million
Direct employment	=	33 600
GDP per employee	=	$79 940
Average wage (1994)	=	$51 159
Share of GDP	=	0.5 percent
Share of manufacturing GDP	=	2.6 percent
Share of manufacturing employment	=	2.0 percent

Source: Statistics Canada, *Industrial Monitor*, monthly.

2.1 Global Context

Steel's mid-century boom was followed by oversupply in 1970s, with consequent adjustments to a customer-driven market

The steady growth in the demand for steel and its derivatives after the Second World War prompted an increase in global steel capacity through the construction and expansion of steel plants throughout the world. However, following the oil crisis in 1973, a global recession caused growth in steel demand to slow significantly and led to a chronic overcapacity in many producer nations. In turn, this resulted in an extremely competitive trade environment for primary steel products that depressed international prices and changed the market from supplier-driven to customer-driven. This has caused companies to rethink strategies with respect to markets and product mixes.

Greater competition in North America, not only from foreign steel suppliers but also from substitute materials, has caused customers to demand higher-quality steel with enhanced physical properties. All of these factors, plus the recession of the early 1980s, led to significant changes in the steel industry. Quality and efficiency had to be enhanced and costs had to be reduced in order for firms to compete and survive. Companies responded by using more efficient and more productive technology as well as by decreasing the size of their labour forces.

Market Structure

Large-production plants use BOF method . . .

Steel is produced by one of two main processes: basic oxygen furnace (BOF) and electric arc furnace (EAF). For many years, the predominant steelmaking technology was to create iron from iron ore in a blast furnace using coke, then refine it in a BOF to produce steel. This technology required major capital investments and large-scale production, with such facilities usually capable of producing in excess of two million tonnes of steel annually. With these facilities, steelmakers were capable of producing the full range of steel products, from basic, commodity grades to high-end flat products.

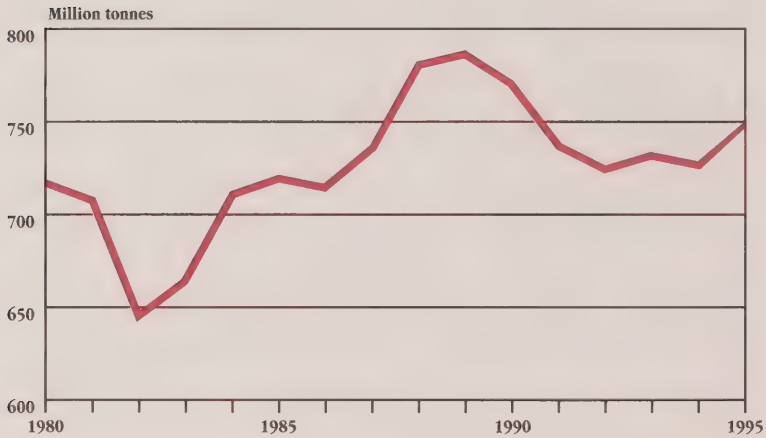
squeezed by less-capital-intensive electric arc furnace (EAF) method

EAF steelmaking, originally used on a small scale for specialty and stainless production, avoided the coke-making and blast furnace stages by melting scrap to make steel. This "mini-mill" technology was less capital intensive and permitted new entrants to the industry, firms that often specialized in producing a more limited range of products than that offered by integrated mills. Such mills typically had a capacity of 250 000 to one million tonnes annually. However, over time, EAF steelmakers have expanded beyond bars and rods into carbon structural products and then into flat-rolled products. This expansion into the flat-rolled segment of the market accelerated following the successful combination of EAF steelmaking with thin-slab casting in 1987. Consequently, most of the new EAF thin-slab, hot-strip mills being built in North America to produce flat-rolled products will have capacities in the range of one million to two million tonnes annually.

Canada imports some steel for domestic consumption

Steel manufacturing has become global in nature. Once the domain of industrialized countries, it is now produced in 56 countries around the world, with the top five countries in 1995 (Japan, the United States, China, Russia and Germany) accounting for more than 50 percent of the total world production of raw steel (Figure 1). Although proximity to markets provides a competitive advantage, international steel trade has risen significantly; in many industrialized countries including Canada, imports are a substantial component of domestic consumption.

Figure 1. World Raw Steel Production



Source: International Iron and Steel Institute, 1996.

Despite the very large capacity of some steel mills and steel companies, no individual producer or group of producers dominates the global market. In fact, in 1995, the world's 25 largest steel companies accounted for only 36 percent of global steel production (Table 2). There has been some increase in foreign ownership and partnerships during the past decade; few companies, however, have ventured far from their home market to any great extent.

Table 2. The 25 Top Raw Steel Producers, World, 1995

Company	Country of ownership	Ranking	1995 production (million tonnes)	% change 1995/1994
Nippon Steel	Japan	1	26.84	5.3
Posco	Republic of Korea	2	23.43	5.9
British Steel	United Kingdom	3	15.74	21.9
Usinor Sacilor	France	4	15.50	-16.2
Riva (including Ilva Group)	Italy	5	14.40	158.5
Arbed (including Stahlwerke Bremen)	Luxembourg	6	11.50	30.8
NKK	Japan	7	11.26	3.7
U.S. Steel	United States	8	11.03	4.2
Kawasaki	Japan	9	10.44	3.8
Sumitomo Metal Ind.	Japan	10	10.44	3.3
Thyssen	Germany	11	10.40	-2.8
SAIL	India	12	10.25	2.0
Bethlehem Steel	United States	13	9.46	6.5
BHP	Australia	14	8.53	0.9
Baoshan	China	15	8.22	13.1
Cherepovets	Russia	16	8.16	15.9
Anshan	China	17	8.13	-0.4
Shougang	China	18	8.00	-2.9
LTV Steel	United States	19	7.68	2.5
Magnitogorsk	Russia	20	7.62	4.0
Nucor	United States	21	7.14	8.0
Novolipetsk	Russia	22	7.04	25.7
Iscor	South Africa	23	7.00	1.3
China Steel	Taiwan	24	6.33	-1.7
Hoogovens	Netherlands	25	6.15	3.4

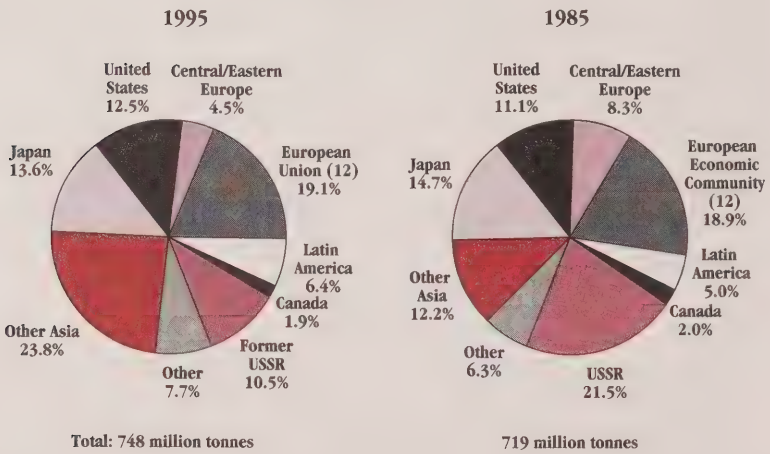
Source: *Metal Bulletin*, 1996.

Canada accounts for 2% of global steel production

Global Market Shifts

Between 1985 and 1995, world raw steel production edged upward by a modest 29 million tonnes. Over this period, Canada's share of global production decreased slightly from 2.0 percent to 1.9 percent. Canada's share fluctuated around 2.0 percent over this period except in 1990 and 1991, when it fell to 1.6 percent and 1.8 percent, respectively, because of reduced demand following the recession of 1990–92. Over the same period, the United States has seen its share increase from 11.1 percent to 12.5 percent (Figure 2) primarily because of additional capacity coming on-line. Japan's strong position eased somewhat over the period, mainly because of the strength of the yen relative to most foreign currencies and the reduced demand for Japanese automobiles, which curtailed Japan's domestic steel consumption.

Figure 2. World Raw Steel Production



Total: 748 million tonnes

719 million tonnes

Source: *Metal Bulletin*, 1996.

Reductions in capacity by some central and eastern European countries and the breakup of the former Soviet Union have resulted in substantial production declines in both regions over the past 10 years. This has been offset by increased output in Asian countries other than Japan and in some South American countries. Asia now accounts for 38 percent of the world's raw steel production, with output in China, the Republic of Korea and Taiwan more than doubling since 1983. This trend is expected to continue. However, for the foreseeable future (next five to 10 years), North America is expected to remain among the largest and most lucrative markets in the world. This is a function of the number and variety of steel and steel products producers, the openness of the market to imports and the fact that price levels here are often higher than those in many other export markets. The expected modest future growth in steel demand in North America will continue to provide opportunities for competitive steel companies.

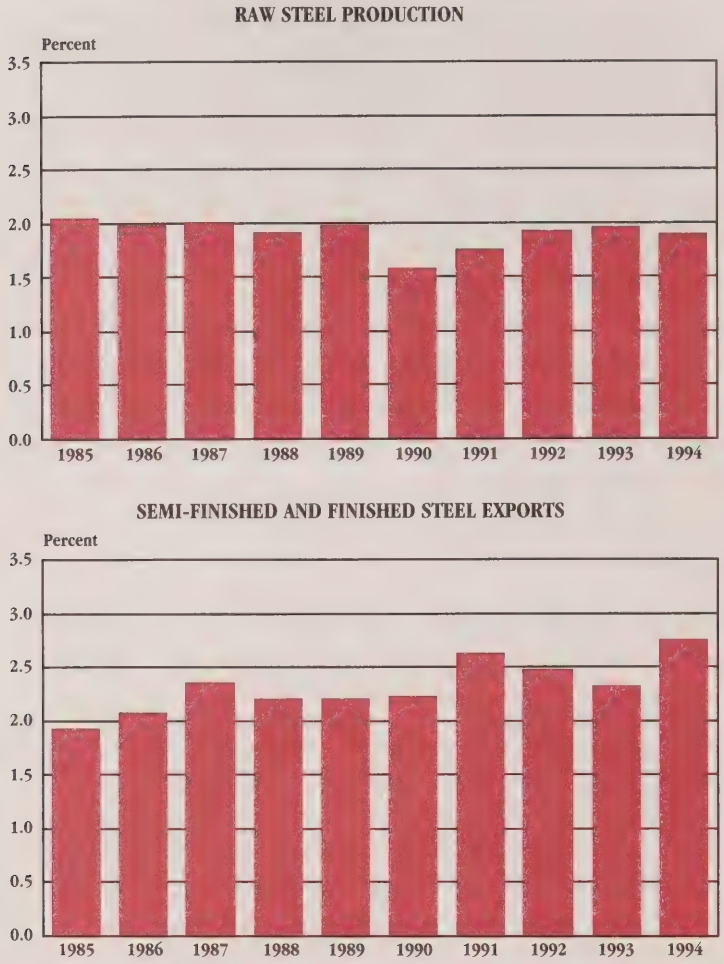
Canadian Participation

Canada is 13th largest producer of steel . . .

Canada was the world's thirteenth largest producer of steel in 1995, accounting for nearly 2 percent of total world supply. Additionally, Canada is a significant exporter of steel, providing almost 3 percent of the total world trade (Figure 3). Compared with the annual output of the top steel producers (Nippon Steel in Japan with 28.11 million tonnes and Posco in the Republic of Korea with 24.38 million tonnes), however, even the largest Canadian firms are relatively small. In 1995, Stelco Inc. produced 4.51 million tonnes of raw steel, Dofasco Inc. 2.54 million tonnes and Algoma Steel Inc. 2.02 million tonnes (Table 3). By late 1996, Dofasco's Canadian production capacity will be 3.6 million tonnes.

at over 9 Mt per year, and rising

Figure 3. Canada's Share of Global Steel Production and Exports



Source: International Iron and Steel Institute, *Steel Statistical Yearbook*, 1993; U.S. Steel, *Semiannual Monitoring Report*, April 1995.

Table 3. Top Raw Steel Producers, Canada, 1995

Company	Country of ownership	Ranking	1995 production (million tonnes)	% change 1995/1994
Ispat Group[a]	Indonesia	26	5.96	19.2
Stelco	Canada	40	4.51	2.7
Gerdau[b]	Brazil	58	3.27	-2.1
Dofasco	Canada	74	2.54	7.6
Co-Steel	Canada	84	2.18	0.0
Algoma	Canada	91	2.02	-4.7

[a] Ispat Group owns Sidbec-Dosco (Ispat) Inc. in Quebec.
[b] Gerdau owns Gerdau Courtice Steel Inc. in Ontario and Gerdau MRM Steel Inc. in Manitoba.
Source: *Metal Bulletin*, 1996.

Domestic mills generally cannot compete profitably outside North America against low-cost foreign producers. Higher transportation costs and, increasingly, the existence of non-tariff trade barriers are the primary explanation. There are exceptions in specific offshore markets where factors other than just price are important, such as quality, delivery and service, or in markets experiencing strong demand that attract imports from many countries.

Canada's exports outside NA struggle against transportation costs, non-tariff barriers and lower costs of production

2.2 North American Context

Canada exports 35% of total shipments, 89% to U.S.

Canada and the United States are each other's principal trading partner, in general and in the case of steel. In 1995, some 89 percent of Canadian steel exports (representing 35 percent of the total Canadian steel shipments) were destined for the U.S. Reciprocally, 58 percent of Canadian steel imports originated from the U.S. This important relationship continues even during depressed economic conditions (Figure 4).

JIT delivery to manufacturers is key to Canadian steel production

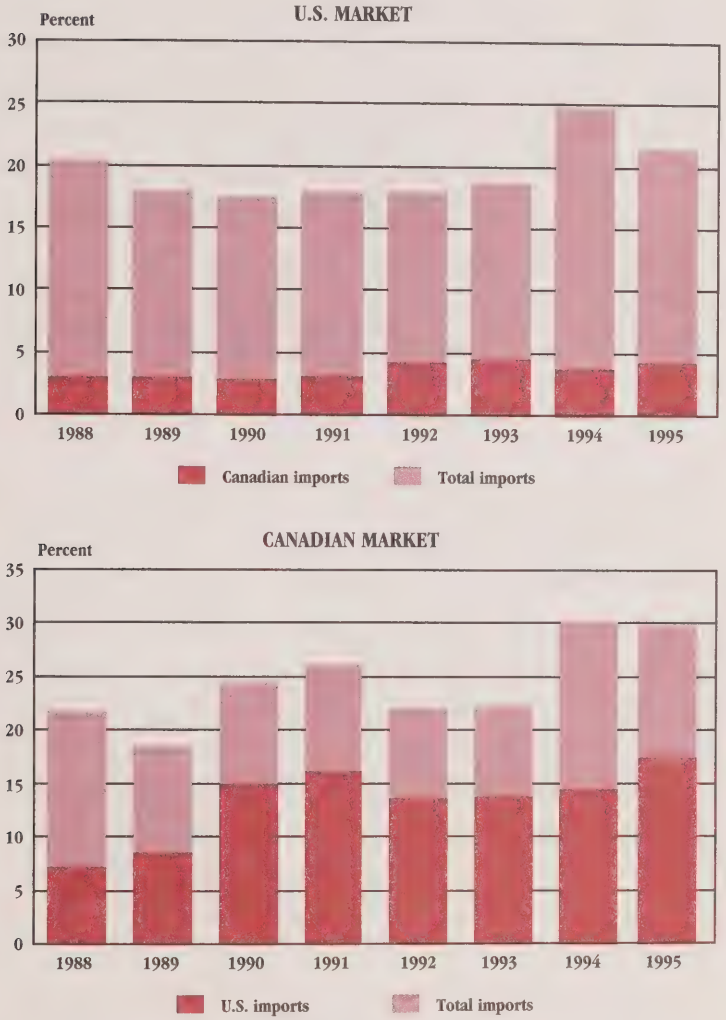
Canadian mills can successfully supply major Canadian and U.S. manufacturing sectors (i.e. automotive, appliance, construction and oil industry tubular markets) that have specific, demanding needs for products and services such as "just in time" delivery. Steel producers no longer concentrate on volume alone; rather, companies bid on specific product characteristics at a price that will use plant capacity and earn a reasonable profit. In this context, proximity to one of the largest and most lucrative international steel markets is a major factor in the strength of the Canadian industry.

Canada needs access to U.S. markets, worries about U.S. trade actions

Continued and unrestricted access to the U.S. market is therefore of vital importance to the Canadian steel industry. The huge increase in U.S. imports during 1994 (from virtually all sources except Canada), which has fallen back only slightly during 1995, creates a threat to this trade. During the next economic slowdown, U.S. mills are likely to resort to a new round of trade actions (by filing anti-dumping and subsidy complaints) in an attempt to drive out unfairly traded foreign steel. Unless there is some progress on how such actions are filed or prosecuted under the terms of the North American Free Trade Agreement (NAFTA) among Canada, the United States and Mexico to develop alternatives to such indiscriminate trade actions, Canada once again is likely to be subject to charges of unfair trading practices by U.S. steelmakers.

"The high level of steel imports now being sold in Canada and the U.S. will not be willingly withdrawn when the steel cycle hits a downturn, in all likelihood setting off a new round of both U.S. and Canadian steel trade cases."
— IPSCO Inc., *Annual Report*, 1994

Figure 4. Steel Imports as a Share of Apparent Domestic Consumption, Canada and the United States



Source: Statistics Canada, Trade Data, 1996; U.S. Bureau of the Census, 1996.

2.3 Canadian Industry Snapshot

Firms in the Canadian steel industry are both privately owned and publicly owned through shares traded on stock exchanges. Sydney Steel Corporation (Sysco) in Nova Scotia and Sidbec-Dosco (Ispat) Inc. in Quebec were once wholly provincially owned, but both were privatized in 1994; the Nova Scotia government still maintains a conditional interest in Sysco, however. Sysco, Sidbec-Dosco (Ispat), Atlas Stainless Steels, Atlas Specialty Steels, Gerdau Courtice Steel Inc., Gerdau MRM Steel Inc. and QIT-Fer et Titane Inc. are foreign-owned steelmakers. The other six firms in the industry, representing approximately 80 percent in capacity terms, are Canadian owned; together they account for 9.5 million tonnes of Canada's 15.9-million tonne steelmaking capacity (Figure 5) and 70 percent of total steel industry employment.

80% of Canada's steel production is by Canadian-owned firms

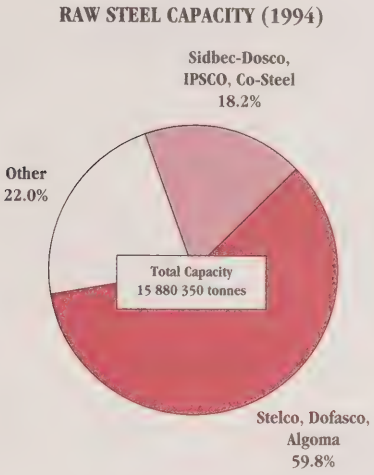
Increasingly, mills use both EAF and BOF production processes

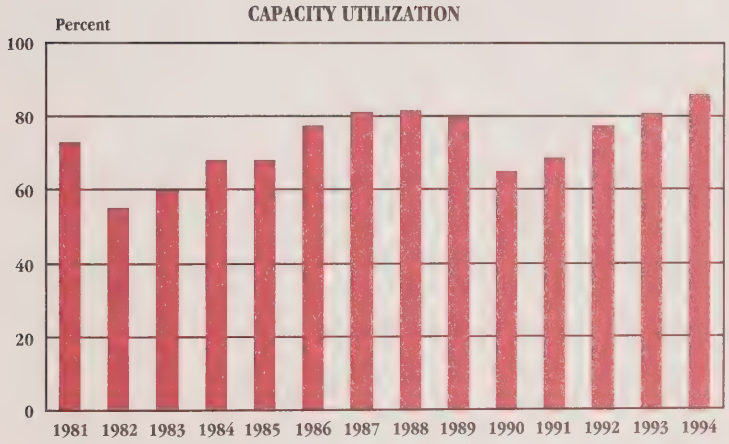
Stelco's Lake Erie Works, commissioned starting in 1980, is the newest integrated facility in North America. Other integrated facilities include Stelco's Hilton Works, Dofasco and Algoma. The remaining 13 steelmaking facilities are mini-mills operating EAF facilities: Co-Steel Lasco, Sidbec-Dosco (Ispat), IPSCO Inc., Ivaco Inc., Atlas Stainless, Atlas Specialty, Gerdau MRM Steel, Stelco-McMaster Ltée., Stelco-AltaSteel Ltd., Gerdau Courtice Steel Inc., Slater Steels–Hamilton Specialty Bar Division and Sysco. They produce flat products, long products, stainless steels and specialty steels. The thirteenth firm, QIT-Fer et Titane, produces iron from ilmenite (composed of iron, titanium and oxygen) ore using a proprietary electric furnace process and then uses an oxygen furnace to produce iron and steel.

"[The EAF process] will provide an additional 1.35 million tons of steel . . . in late 1996. . . . Dofasco will have increased the capacity in Hamilton by almost 50% without additions to the work force."
— John Mayberry, President and CEO, Dofasco, *Annual Report*, 1995

The distinction between integrated mills and mini-mills may be becoming less meaningful as combinations of technologies are introduced. As an example, Dofasco is combining EAF steelmaking with traditional blast furnace operations in Hamilton, Ontario, to produce high-quality steel products. Similarly, Algoma is combining thin-slab casting with its blast furnace/BOF operation in Sault Ste. Marie, Ontario. Because of the advantages associated with EAF operations, many integrated mills are looking to optimizing their melt operations by installing more EAF capacity.

Figure 5. Canadian Steel Industry Capacity





Source: National Research Council, *Metallurgical Works in Canada: Primary Iron and Steel*, 1995.

Ontario has 70% of Canadian steel production

Proximity to markets has strongly influenced concentration of the steel industry in Ontario, which accounts for 70 percent of the total Canadian production capacity. Although physical factors such as proximity to market, access to water transportation and energy sources, and availability of raw materials influence the location of a new mill, it may be argued that investment climate and business factors play increasingly important roles. Indeed, Canadian locations are in competition with those in various U.S. states, where mills are able to negotiate long-term, low-cost electricity contracts, state assistance for skills training, state assistance for infrastructure development as well as financial incentives or tax abatements for new facilities.

Contribution to the Canadian Economy

Steel contributes $3.6 billion value-added to Canada's economy . . .

In 1994, the Canadian steel industry contributed $3.6 billion (in current dollars) in value-added terms to the Canadian economy. The ferrous metals sector as a whole (which is dominated by the steel industry) has increased by 345 percent over the period from 1970 to 1991. However, the sector's contribution to total manufacturing value-added in Canada over the 1970–90 period has declined by 1.9 percent per year.

or about 0.5% of GDP

Statistics Canada figures indicate that the entire primary steel industry (as defined in Statistics Canada's 1980 Standard Industrial Classification code 291, which is slightly broader than the scope of this study) accounted for about 2.6 percent of the manufacturing sector's value-added and about 0.5 percent of the economy's gross domestic product (GDP) in 1995. Those figures have been fairly constant since 1990. The decline in the sector's contribution to total manufacturing and to the whole economy is also seen in other developed countries and reflects the fact that modern post-industrial economies are less steel-intensive than those just beginning the industrialization process.

Government Participation

Both the federal and provincial governments have had a significant impact on the industry over the years. Two provincial Crown corporations, Sysco in Nova Scotia and Sidbec-Dosco in Quebec, received hundreds of millions of dollars to cover operating losses in the late 1970s and early 1980s. Sysco's 1987 modernization program was provincially and federally funded. The federal government's commitment of assistance to Sysco predated a 1984 government policy that it would not provide any form of capital assistance to the industry. Since 1992, the federal government has had no financial involvement with Sysco.

Federal government no longer provides capital assistance to industry

Human Resources

In 1995, some 33 600 people were employed in the Canadian steel industry. The industry has been, and continues to be, a major source of high-wage jobs in the Canadian economy. In recent years, the average yearly wage ($51 159 in 1994) has been nearly 70 percent higher than the Canadian average.

Primary steel employed 33 600 in 1995 . . .

working for wages 70% above average . . .

Canadian steel employees fared relatively well compared with their American and European counterparts during the restructuring of the 1980s, because the Canadian industry was leaner and more productive in the first place. However, employment in the Canadian steel industry from 1985 to 1995 still dropped by about 15 000 employees or by approximately 30 percent.

but suffering cuts of up to 30%

Canadian steelworks are almost exclusively represented by the United Steelworkers, with the exception of Dofasco, which is not unionized. All steel companies belong to the Canadian Steel Producers Association.

"In the steel industry, the average salary is very high and climbed 4.5% in 1993 alone."
— Nuala Beck, *Excelerate: Growing in the New Economy*, 1995

In 1994, on average, each steel industry employee produced 481 tonnes of steel and $320 285 in sales. The value-added per employee was 50 percent higher in steelmaking than in Canadian manufacturing generally.

Productivity is high and still improving

Productivity in the steel industry has improved significantly. From 1984 to 1994 there has been:

- a 32-percent increase in tonnage produced per employee
- a more than 89-percent increase in sales per employee
- a 43-percent increase in GDP per employee (Figure 6).

Figure 6. Increasing Labour Productivity in the Canadian Steel Industry

Source: Statistics Canada, CANSIM Database: Employment L56941, GDP I34357.

This improvement in productivity took place at a time when industry employment declined from 40 700 in 1990 to 31 500 in 1994. Over this period, raw steel production increased from a low of 12.2 million tonnes in 1990 to 13.8 million tonnes in 1994, several firms divested themselves of non-core businesses, companies shifted from a production orientation to a strong focus on customer needs, and most firms restructured by reducing layers of management and by encouraging teamwork and employee empowerment.

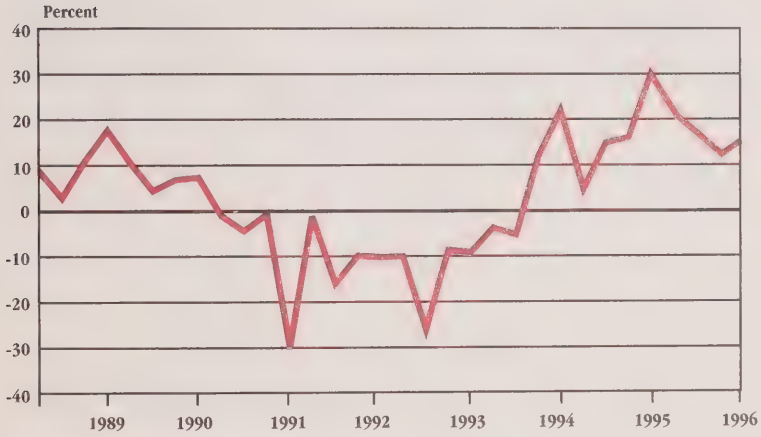
2.4 Performance and Competitiveness

The recession between 1990 and 1992 adversely affected the financial performance of the Canadian steelmakers, resulting in combined losses totalling more than $2 billion over that period and adding significant debt load to company balance sheets.

Recession in 1990–92 hit Canadian steel for $2 billion loss, causing debt load on mills

The situation began to improve in the second half of 1993 and throughout 1994–95 (Figure 7).

Figure 7. Return on Equity, Canadian Steel Industry

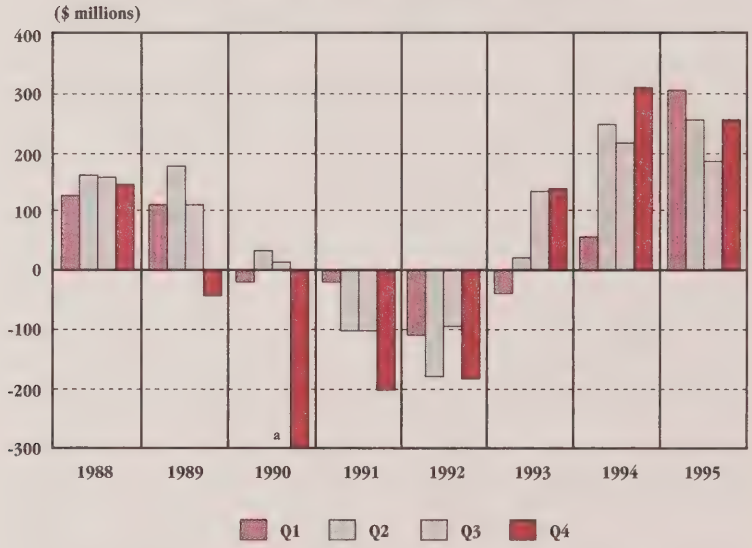


Source: Statistics Canada, Catalogue No. 61-008, quarterly.

"Canada's export competitiveness has greatly improved in the last few years. . . . Our trade balance has shown spectacular improvements."
— Milton Harris, Chairman and CEO, Harris Steel Group Inc.

Record domestic steel consumption during 1994 in both Canada and the U.S., substantial global steel price increases, and the recent cost-cutting and restructuring efforts on the part of the Canadian industry have all contributed to the return to profitability. Net profit/losses for the Canadian industry between 1988–95 are illustrated in Figure 8.

Figure 8. Net Profit (Loss), Canadian Steel Industry

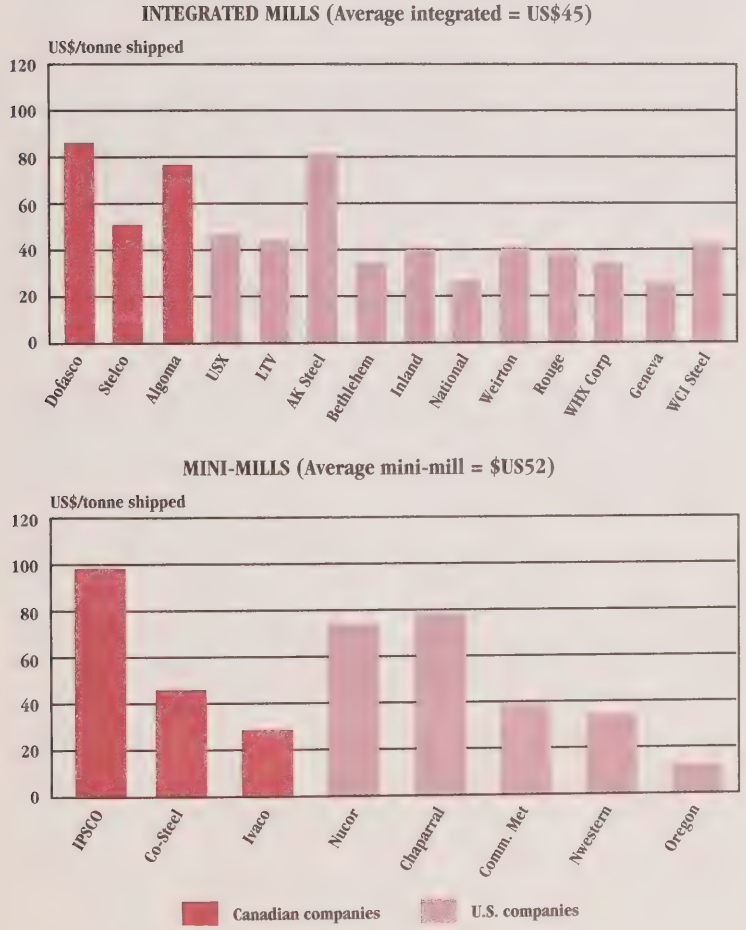


[a] Actual net losses for the 1990 fourth quarter were $1.42 billion and are not displayed for reasons of scale. The loss resulted from extraordinary items, including the Dofasco writedown of its Algoma investment and Algoma's revaluation of assets.

Source: Statistics Canada, Catalogue No. 61-008, quarterly.

A comparison of corporate profitability in terms of earnings before interest and taxes (Figure 9) reveals that Canadian mills in both major operating categories are currently among the most profitable in North America. The restructuring undergone by the Canadian producers in the early 1990s has resulted in a highly profitable industry.

Figure 9. Comparison of Company Operating Ratios, Earnings Before Interest and Taxes, 1995



Source: *American Metal Market*, February and May, 1996.

3 CHANGING CONDITIONS AND INDUSTRY RESPONSE

3.1 Investment and Financing

Cost reduction and higher quality are key to market success

Most Canadian producers have been undertaking capital spending to meet two primary objectives: cost reduction, which is essential for improved profitability and a secure market share for steel products; and higher product quality, which allows producers to satisfy increasing customer demands.

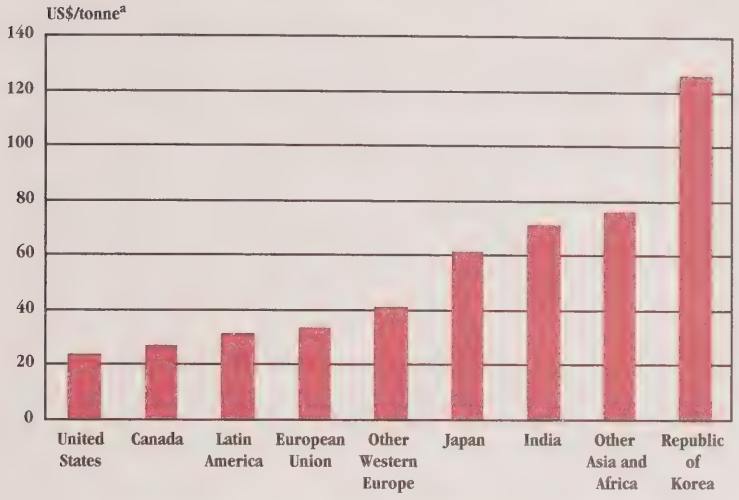
Canadian steel firms invested $7.8 billion in upgraded facilities, now plan new mills

Between 1980 and 1995, the Canadian iron and steel industry made $7.8 billion in capital expenditures. Despite this large investment, no new capacity was added; instead, emphasis was placed on developing state-of-the-art finishing facilities and on cost reduction/productivity improvement projects. More recently, however, steel companies have begun planning new steelmaking capacity to replace existing facilities or those closed because of technological obsolescence.

"This is a classic 'chicken and egg' scenario in that ongoing profits finance upgrading and upgrading is required to remain profitable."
— IPSCO Inc., *Annual Report*, 1994

Canada's average capital outlay per tonne from 1987 to 1993 was approximately US$23.60. Although this amount was greater than that in the United States, it was well below that in a number of other countries, particularly the Republic of Korea at US$125.80 per tonne over this period (Figure 10). The Korean figure is so high because its steelmaking capacity doubled over this period, whereas in Canada, Japan and most other industrialized nations, existing steelmaking capacity was relatively unchanged and new investment was usually made to upgrade existing facilities or add new finishing capabilities.

Figure 10. Average Steel Industry Capital Outlays per Tonne Produced, World



[a] The home currency figure for each year has been converted into U.S. dollars at the exchange rate on September 1 of that year.

Source: Paine Webber, *World Steel Dynamics: Steel Strategist*, May 1995.

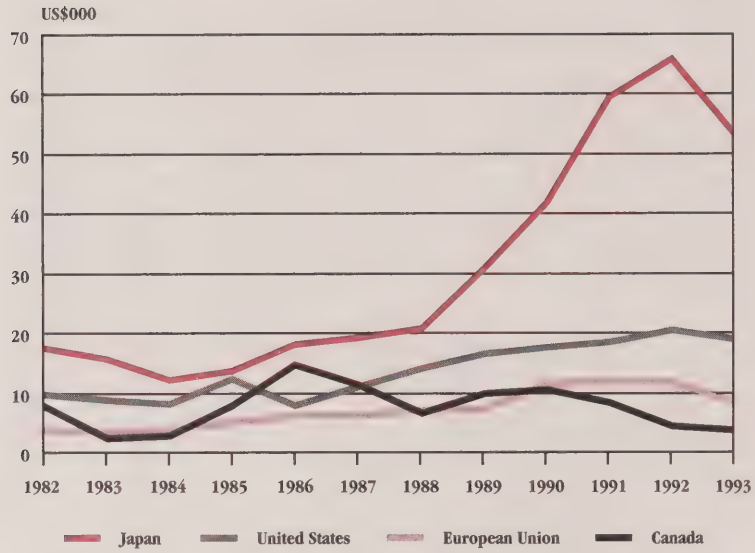
Despite this significant level of expenditure, Canada's capital outlays have recently decreased relative to those in other industrialized countries. Canada's ratio of capital outlays to employees has been below that of Japan, the European Union and the U.S. since 1990 (Figure 11).

Canada's capital outlays have been less than in other steelmaking countries . . .

On the basis of capital outlays per tonne shipped, a comparison with U.S. counterparts indicates that Canadian steel industry capital outlays in 1994 were approximately one half the level of the U.S. industry. The recent low capital expenditures have been caused in large part by the financial difficulties experienced by the industry in the early 1990s. On the basis of total dollar value, Canadian capital outlays remained constant in 1993 and 1994 at $227 million.

half that of U.S. . . .

Figure 11. Average Steel Industry Capital Outlays per Employee, World, 1982–93



Source: Paine Webber, *World Steel Dynamics: Core Report 20*, February 1995.

because Canada has focussed on investments in productivity, quality and pollution abatement

Much of this investment has gone into productivity and quality-enhancing technologies. Capital spending nearly doubled in 1995 to $525 million and preliminary indications are for a 1996 level of $680 million. Pollution abatement equipment and steelmaking capacity expansions are two key areas of expenditure. The investment in expansion accounts for most of the increased capital spending since 1994.

U.S. increases capacity

The Canadian situation is in marked contrast to the situation in the U.S., where the steel industry is planning (and has built) significant capacity expansions, especially for flat-rolled steel products. Between 1989 and 1995, some 5.3 million tonnes of such capacity was added, whereas between 1996 and the year 2000, additional capacity totalling 10.6 million tonnes is planned. If all this capacity is added, by the year 2000, the flat-rolled production capacity in the U.S. will be 20 percent higher than it was in 1988.

3.2 Trade

Canada–U.S. Trade

The closely integrated North American steel trade is a good example of the range of Canada–U.S. trading relationships, in which each country is the other's largest export customer. Hundreds of companies such as steel producers, service centres, fabricators, brokers and end users are involved in the cross-border shipments of steel. Additionally, it is not uncommon for a single steel product to cross the border more than once during production.

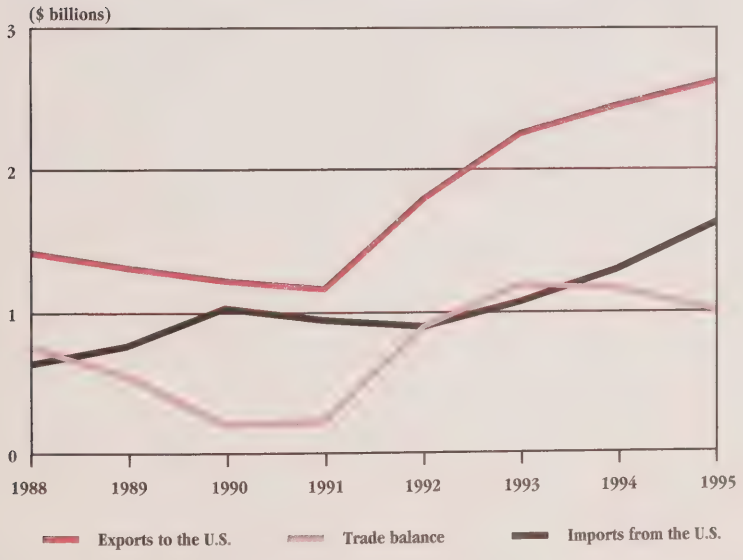
In 1995, steel trade between Canada and the U.S. totalled $4.3 billion, made up of Canadian steel exports to the U.S. worth $2.7 billion and imports from the U.S. into Canada worth $1.6 billion (Figure 12). Although the steel trade balance is in Canada's favour, industry officials contend that for every dollar of exports to the United States, Canadian steel mills spend $1.20 to $1.40 in the U.S. for raw materials (coal, iron ore and scrap) and other goods and services (machinery and equipment and engineering services).

"For the steel industry, the free trade idea starts with the advantages of common bonds of competitive behaviour. . . ."

— Jacques Singer, *Trade Liberalization and the Canadian Steel Industry*, 1970

Steel trade in 1995 was $4.3 billion: $2.7 billion U.S. imports and $1.6 billion Canadian imports

Figure 12. Canada–U.S. Trade in Steel Products



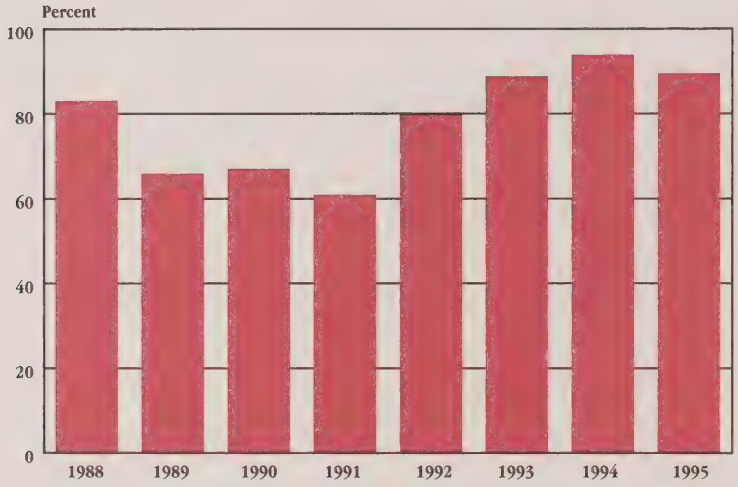
Source: Statistics Canada, TIERS (for SIC 2919).

Canada exported $3 billion of steel in 1995

International Trade

Canada is a significant trader of steel, providing almost 3 percent of total world exports. In 1995, Canadian steel exports amounted to $3.0 billion. The Canadian steel industry is heavily reliant on the U.S. market, with close to 88 percent of Canadian exports by value going to the U.S. in 1995 (Figure 13).

Figure 13. Canadian Steel Exports to the United States as a Share of Total Canadian Steel Exports



Source: Statistics Canada, TIERS (for SIC 2919).

In 1993, Canada had a global steel trade surplus of $580 million and a steel trade surplus with the U.S. of $909 million. While the trade surplus was maintained with the U.S., the surge in steel demand in 1994 resulted in a dramatic rise in imports (especially in steel slabs, plates and sheets) and produced an overall international trade deficit of $207 million. The total trade balance deficit increased in 1995 to $349 million as Canadian imports again exceeded exports. However, the steel trade surplus with the U.S. was $1.0 billion in 1995.

Steel balance of trade has seesawed between U.S. and Canada, with a surplus in Canada's favour of $1 billion in 1995

Over the period from 1989 to 1995, steel imports have increased from 18.6 percent of apparent domestic consumption in Canada to 29.9 percent in 1995. Meanwhile the import share held by the U.S. increased from 8.6 percent to 17.5 percent. In the U.S. market, imports increased from 17.9 percent of apparent domestic consumption in 1989 to 21.4 percent in 1995, with Canada's import share increasing from 3.1 percent to 4.0 percent.

Role of Governments

The desire of some governments to use steelmakers as instruments of social policy to maintain employment without regard for economic viability has contributed to widespread practices of unfair steel trading (i.e. dumping or subsidizing it). Since at least the 1980s, these actions have fostered trade laws and regulations that are increasingly severe in an attempt to deal with unfairly traded steel. The result has been a worldwide surge in steel trade actions, with the steel industry often the largest user of a nation's trade remedy legislation.

Government intervention in steelmaking has distorted world market . . .

and led to anti-dumping and countervail actions by Canada and U.S.

"We want to compete business to business . . . but as long as we have to compete business to lawsuit, we need your help to have a competitive framework."
— Jean Van Loon, President, Canadian Steel Producers Association, to House of Commons Foreign Affairs and International Trade Committee

With NAFTA and an integrated market, unfair trade actions are inappropriate

The latest round of such actions began in North America shortly after the expiration of the U.S. Voluntary Restraint Agreements (VRA) in 1992, which had stopped most, if not all, U.S. trade actions in steel, in return for foreign governments (and steelmakers) restricting the export of steel to the U.S. market. On June 30, 1992, the U.S. initiated anti-dumping and/or countervail cases against more than 80 countries, including Canada, that exported steel to the U.S. Since then, Canada has initiated seven steel trade cases. The European Union, Australia, Japan and Mexico have also taken trade action against unfairly traded steel in the same time period.

With the FTA and then the NAFTA and the increasingly integrated North American market, Canadian steelmakers regard the use of anti-dumping and countervailing duty actions to deal with allegations of unfair trade to be inappropriate. It is the industry's view that the North American market should allow domestic mills to compete exclusively on price, quality and service within the NAFTA area and to take a coordinated approach against unfairly traded and injurious offshore trade.

Unfortunately, the establishment of working groups under the NAFTA to seek necessary changes to existing trade remedy legislation and procedures has not led to any progress. Although disappointed with the lack of movement on this important issue, the industry continues to press the government to address the matter with the appropriate Mexican and U.S. authorities.

With the implementation in 1995 of the World Trade Organization following seven years of Uruguay Round multilateral trade negotiations under the General Agreement on Tariffs and Trade and with changes to tariffs and some anti-dumping procedures, Canadian steel producers will be most affected by the legislation and regulations adopted to give effect to these changes in Canada and the U.S. The recently announced review of the *Special Import Measures Act* (SIMA), Canada's trade remedy legislation, will provide another opportunity for the industry (and anyone else affected) to comment on the differences and effectiveness of both the legislation and accompanying regulations in Canada and the U.S. Indeed, in the absence of any changes in the position of other NAFTA governments — especially the U.S. — to amend existing trade remedy legislation to better reflect the integrated North American market, the Canadian steel industry is requesting the government to consider changes to Canada's trade remedy legislation and procedures to ensure that Canadian producers receive no less protection from unfairly traded products than the U.S. industry receives.

Canadian steelmakers want enhanced trade remedy legislation . . .

providing them no less protection than U.S. firms

3.3 Technological Change

Steel Processes

Changes in steelmaking process technology tend to occur in large increments and to involve substantial capital investment. Sudden fundamental breakthroughs are most unusual. The life span of these changes is therefore, by necessity, long. Scrapping serviceable, fully depreciated assets can be justified only where operating savings and/or product quality considerations offset capital costs.

Canada keeps pace with industry modernization

Steelmaking technology is internationally available, and Canadian producers have a history of commercializing technological advances at an early date. For example, over 96 percent of Canadian steel production volume is continuously cast, and open hearth furnace capacity was idled several years before similar plants in the U.S. were idled.

Hot-rolled Capacity

Flat products account for 70% of market

Thin-slab casting technology has been described as a revolutionary steelmaking process whose effect on the industry is comparable with the development of the Bessemer furnace back in the late 1800s. With this technology, mini-mills have increased their penetration into flat-rolled products, which represent about 70 percent of the overall steel market.

The existing hot-rolled capacity in North America is approximately 73 million tonnes, including specialty steel and plate produced in a hot-strip mill: 64 million tonnes in the U.S. and 9 million tonnes in Canada. Mini-mills account for 16 percent of this capacity and produce mostly specialty/stainless steel, carbon steel plate or feedstock for internal pipe manufacturing.

Direct Reduced Iron Production

With increasing concern over global demand for low residual scrap needed to manufacture high-quality sheet steels, companies are investigating alternate iron sources such as direct reduced iron (DRI), hot briquetted iron (HBI) or iron carbide. DRI technology was introduced in the 1970s. This process uses natural gas to reduce the iron oxides in iron ore pellets to produce iron. This is equivalent to the process achieved in a blast furnace. Modifications to EAFs now permit the usage of up to 50 percent DRI in the charge, although typical mini-mill charges range from 100 percent scrap to 70 percent scrap and 30 percent pure iron units (i.e. DRI/HBI or iron carbide).

Global DRI production was around 27 million tonnes in 1994, and preliminary 1995 estimates indicate an increase to 31 million tonnes. Most DRI facilities are in developing countries because of the availability of cheap energy and the fact that steel scrap is relatively expensive in these areas.

DRI technology provides a substitute for scrap

Since DRI is essentially a substitute for scrap, it is the most attractive alternative when scrap prices are high. Estimates by Paine Webber (*World Steel Dynamics: Steel Strategist 21*, May 1995) indicate that domestic DRI production facilities are economically justifiable only when compared with low residual scrap prices of $150 per tonne or higher. Thus, the low North American DRI production capacity can be primarily explained by the historically low domestic scrap prices. Increasing scrap demand, generated by the growing EAF capacity and new interest from BOF operators, however, has raised expectations of future low residual scrap shortages. So steel companies are investigating increased domestic DRI supply. For example, the Sidbec-Dosco DRI facility at Contrecoeur, Quebec, increased its production from around 720 000 tonnes in 1994 to 1.3 million tonnes in 1995.

Firms increase DRI production as scrap demand rises

Based on these expectations, steel companies will be looking for more scrap alternatives, and this bodes well for increased DRI production. As of March 1995 there were nine DRI plants under construction, with a total capacity of 2.5 million tonnes. The sites are in Mexico, India, China and the Republic of Korea.

50% of today's steel was not possible seven years ago; therefore links to users are essential

"In a corporate undertaking that would have been unheard of five years ago, 24 steelmakers from Japan, Europe and North America ... are working to reduce the weight of the 'Body in White' — the welded steel body shell of a vehicle — by 40% ...

... Housing is now the fastest-growing market for steel in North America. ..."
— Frederick Telmer, Chairman and CEO, Stelco Inc., *Annual Report,* 1994

Steel Products

Steel has changed significantly over time, and dramatically so in recent years. More than half the products steelmakers sell today could not have been made seven years ago. Advances in steel properties have both resulted in and been driven by changes in product design. Automotive body design (body-on-frame to unibody construction) is a good example. As new manufacturing concepts are adopted by steel consumers, steelmakers have increasingly become niche producers that "custom tailor" their manufacturing processes and products.

Consequently, steelmakers are developing much closer relationships with their customers. For example, steel company engineers can now be found sitting on design committees at the leading automotive manufacturing and design facilities.

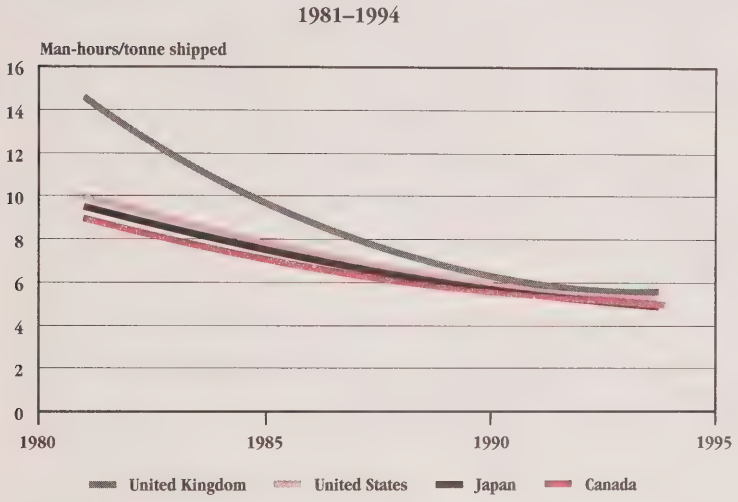
Besides developing new processes and improved product characteristics, the development of new uses and new markets for steel is an important aspect of ensuring future growth for the sector. One area with significant potential is residential home construction, where galvanized steel can be used for framing, interior load-bearing walls and roofing.

3.4 Human Resources

Labour Productivity

The Canadian steel industry is an international leader in labour productivity (Figure 14). Man-hours per tonne shipped for the *World Steel Dynamics*

Figure 14. Steel Industry Labour Productivity



Source: Paine Webber, *World Steel Dynamics: Core Report 20,* May 1995, and *Price Track 51,* February 23, 1996.

Canadian reference plant dropped from 5.7 in 1993, to 5.1 in February 1995, and stands at 4.8 as of January 1996.

Major U.S. mills have also engaged in significant cost-cutting activities in response to the threat posed by mini-mills with their new thin-slab flat-rolling facilities. Nucor is the best example of this (see page 49 for more information on Nucor-type facilities). The Paine Webber's *World Steel Dynamics* 1993 World Cost Curve estimates U.S. mills at 5.1 man-hours per tonne shipped. This figure dropped to 4.7 in 1994 and to 4.3 as of January 1996.

Changed management practices, teamwork and employee empowerment contribute to productivity

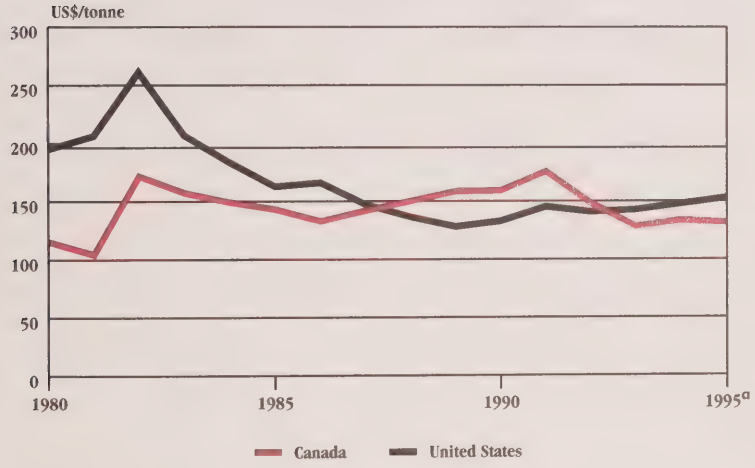
Increased labour productivity has been accompanied by a reorganization of work by steelmakers. At the same time as industry employment levels were falling, firms were moving to cut costs and adopt lean staffing levels. Meanwhile firms were selling off peripheral businesses, and decentralizing profit and loss responsibility to autonomous business units. The changes were accomplished along with a new management style at many firms, which reduced the layers of management and encouraged teamwork and employee empowerment. The end result of all these changes is a culture in which multi-skilling and teamwork are vital components of how work is organized.

Labour Cost

In the early 1980s, the Canadian steel industry on average had a labour cost advantage over its U.S. counterpart of approximately US$80 per tonne. By the end of the decade, this advantage was completely eroded to the point where the Canadian labour cost component in 1990 was US$26 per tonne higher than that in the U.S. (Figure 15). This situation was largely due to the more rapid and extensive restructuring of inefficient U.S. mills and the addition of several state-of-the-art mini-mill facilities.

"The creation of self-directed work groups has lead to a reduction in the level of supervision required and resulted in many operating decisions being made on the shop floor."
— Algoma Steel, *Annual Report*, 1995

Figure 15. Labour Cost Comparison of the Canadian and U.S. Steel Industries



[a] 1995 values are an estimate based on preliminary results.

Source: Paine Webber, *World Steel Dynamics: Price-Cost Model*, 1981–96.

The greatest reduction in U.S. steel labour costs had occurred by 1987. Since that time, overall labour costs have been comparable and have remained stable, with Canada's, being about US$18 a tonne lower in 1995.

Canadian labour cost advantage comes from exchange rate and rising U.S. labour costs

Canada's current labour cost advantage is based on a lower total labour cost than in the U.S., despite a higher number of man-hours needed to produce a tonne of steel in Canada. A major reason for this turnaround is that labour costs have risen faster in the U.S. than in Canada. Also, Paine Webber's *World Steel Dynamics* World Cost Curves are expressed in U.S. funds, so exchange rate fluctuations are a factor. Indeed, in the period from 1989 to 1991, the Canadian dollar had a value of about US$0.84–0.87, but since then it has depreciated to a value of US$0.73 in 1995.

4 GROWTH PROSPECTS

4.1 Investment

Canadian firms' debt-to-equity ratios have been reduced, making capital investment possible

The ability of Canada's steel companies to remain competitive depends mainly on their being able to carry out necessary capital projects. Low debt costs and liquidity are keys to making this happen. Canada's steelmakers have met this competitiveness challenge in recent years. Debt-to-equity ratios are down significantly, and the industry's profitable status is providing the liquidity necessary to undertake major capital investments.

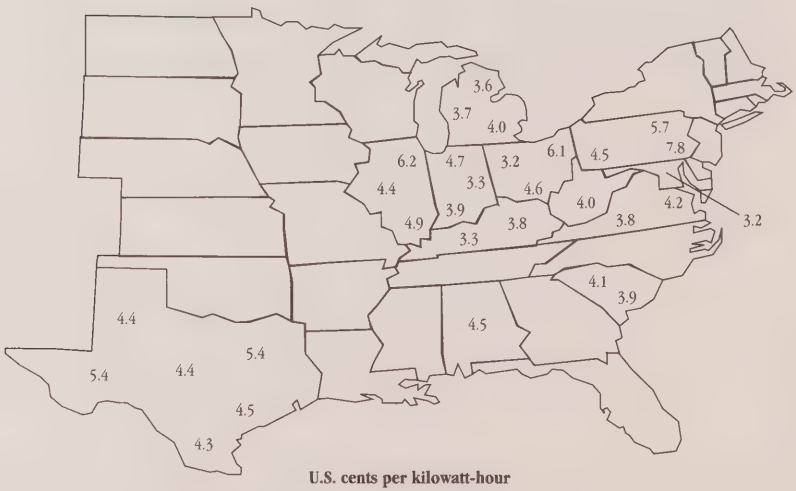
New investment is also critical if labour costs are to be reduced. The introduction of new technology such as automation can enhance labour productivity significantly in the long run.

New investment in Canada depends on the relative attractiveness of investing in Canada versus the United States. This is affected by a wide range of considerations including labour laws, taxes, environmental policies, energy costs, transportation costs, exchange and interest rates as well as market access.

Approximately 9.3 percent of the primary steel industry's total production costs are for energy. Hydro costs are a large cost element. They are rapidly becoming uncompetitive in Canada as the U.S. moves toward deregulation of utility companies. Hydro costs can be the largest single cost for an EAF mill. Integrated mills use proportionately less hydro, but still spend millions of dollars per year on electricity.

The average industrial rate in Ontario for 1994 was 5.8 cents per kilowatt-hour. Using an exchange rate of C$1 = US$0.73, this was equivalent to 4.3 U.S. cents per kilowatt-hour. A comparison with the average industrial rates in major steel-producing U.S. states (Figure 16) reveals that Ontario's rate was above those in a significant number of U.S. locations, even given the current favourable exchange rate.

Figure 16. Average Industrial Electrical Rates in Major Steel-producing States, United States, 1994



Source: Ontario Hydro, *Ontario Hydro and the Electric Power Industry*, June 1995.

As electricity rates have increased, some of Ontario's traditional energy advantage has been lost; many U.S. cities and states now have cheaper energy. This is particularly important because of the high concentration of the industry in Ontario and the fact that future steel-producing capacity expansions are forecast to be primarily electricity-intensive EAF operations.

Hydro costs influence site selection for EAF mills

Rising hydro rates erode Ontario's advantage

4.2 Challenges

The steel market is highly segmented and is changing rapidly, both in size and competitiveness. There are substantial differences among the markets for high-end automotive sheet or tool and stainless steels as opposed to carbon structural products. Changes are taking place in production processes, distribution methods, customer service requirements and competitors. Some Canadian companies are adapting to the changing market by focussing on one or two segments, while others are changing their corporate structure to decentralize responsibility in an effort to be more responsive to changing market conditions and customer needs.

All of the companies have reduced their basic cost structures. For example, they have cut back on management staff, introduced more automated processes, reduced waste and improved energy efficiency.

"Now Stelco's culture embraces the question, 'How might we challenge the traditional way of doing things when they no longer make sense?' "
— *Business Quarterly*, Winter 1995

In addition, selective capital investments designed to improve product quality, yield of existing facilities and/or environmental performance are taking place together with key strategic moves to address new market opportunities. Some examples are:

Canadian firms adopt strategies to cope with new technology and market demands

- Dofasco is concentrating on higher-value-added steel products and is dramatically shifting its focus toward EAF steelmaking.
- Stelco is maintaining a wide range of steel products and has decentralized its structure, establishing six autonomous business units to focus on specific market segments. The company has also sold off a number of non-core assets.
- Algoma has decided to narrow its product focus and is installing a new thin-slab caster linked directly to a new strip mill, which will allow it to meet the most demanding markets for strip sizes, steel grades and quality.
- Sidbec-Dosco has doubled its production of DRI.
- Co-Steel owns 50 percent of Gallatin Steel (Kentucky) in a joint venture with Dofasco, which began production of hot-rolled steel in May 1995.
- IPSCO is building a new medium-slab mill at Montpelier, Iowa, which will have a capacity of 1.2 million tonnes of coiled plate and hot band when it opens in 1997.

Two Canadian firms locate new facilities in U.S.

The latter two investments are examples of decisions being made by Canadian firms to locate new facilities in the U.S. For those firms and these facilities, a U.S. location was judged to be the best place from which to take advantage of the increasing integration occurring within North America.

4.3 Opportunities

Changes in technology, such as enhanced structural properties and improved steelmaking processes, are having a significant impact on the Canadian steel industry and could continue to do so. To remain competitive, some steel firms may be faced with the prospect of scrapping serviceable assets in favour of state-of-the-art technology. This type of decision is usually an expensive one.

New Steel Alloys

Improved quality has moved segments of the industry farther away from commodity-grade markets. Consumers are demanding higher-quality products, and steel companies have responded accordingly with new products such as lighter, stronger, more formable automotive sheet and other products to satisfy niche markets.

New, niche-market super-steel offers new markets . . .

However, the technological improvements in steel properties are potentially a double-edged sword. While these advances allow steel companies to find new markets or prevent the substitution of alternate materials in existing markets, the end result may well be lower consumption of steel. For instance, the development of high-strength, low-alloy (HSLA) steels in sheet applications has reduced demand in this area because HSLA steel is 200—400 percent stronger than regular carbon steel. A 50-percent increase in strength reduces weight by 30 percent while still providing equivalent properties with respect to dent resistance, formability, etc.

but may lead to decreasing tonnes consumed

The Mini-mill "Revolution"

Technological change has reduced barriers of entry to the steel industry. Whereas a greenfield integrated mill (i.e. a new mill in a new location) would require capital investment in the billions of dollars, an EAF mill with a capacity of one million tonnes can be constructed for approximately US$350 million. Several major benefits of this technological change include:

EAF mills offer cost and quality advantages . . .

- lower operating and capital costs
- lower environmental impact
- lower optimal economies of scale
- improved EAF steel quality (shift toward higher-value-added steel).

and are overcoming their limitations

Highly formable "deep drawing" carbon flat-rolled steels remain a stronghold of the integrated steel producers. The major limiting feature for the EAF to date, however, has been in the purity of the raw material, scrap steel. Unlike integrated mills, which use mainly iron ore and ensure the control of home scrap and revert scrap, mini-mill operators have less control and, consequently, can have an unavoidable build-up of unwanted metallic elements, or "residuals," such as copper, chromium, nickel, molybdenum, tin and zinc. It is likely that this quality problem will be overcome with new technology, such as ladle refining technology and the use of alternate iron feed material. Mini-mill quality matching that of integrated mills will create new competition in the high-end flat rolled market.

U.S. firm leads new generation of mini-mills

Leading this mini-mill revolution is a U.S.-based company named Nucor. In 1987, Nucor used a successful combination of EAF steelmaking and thin-slab casting to enter the flat-rolled market. Using non-union labour, located in rural areas with good access to road, rail and river transportation, with cheap power on hand and often with development assistance from state and county governments, Nucor operates lean and highly productive steel mills. A large part of the company's success has been due to its willingness to take risks — with technology, work practices, lean staffing levels and production-based incentives to supplement base pay — to achieve results that integrated steelmakers believed were impossible.

Today Nucor operates two such plants with a combined capacity of 3.6 million tonnes and is building a third facility with a capacity of 1.6 million tonnes, due to start coming on-line in 1997. While focussing initially on commodity grade hot-rolled products, the company has also begun production of stainless steel sheet. With its low cost structure and a pricing policy that frequently adjusts prices in line with mill loading, Nucor has an influence in the industry out of proportion to its size. Although it does not yet compete in the most demanding product applications (e.g. skins for autos and cold-rolled sheet for appliance manufacturers), which remain the preserve of the integrated mills, some observers believe it is only a matter of time before Nucor (or others) address those markets.

Nucor thin-slab, flat-rolled "clones" are now beginning to proliferate in the U.S. Between 1996 and 2000, such mills will add about 10.6 million tonnes of hot strip capacity to the existing 73 million tonnes currently available in North America. While the bulk of this extra capacity is expected to displace imports, some will compete with similar products made by existing North American mills. In the next economic downturn, falling steel prices may force high-cost producers out of the market and put pressure on low-quality, commodity-grade producers as high-quality producers enter the lower-quality markets.

4.4 Environment

Environmental control continues through government programs

Emissions from Canadian steel mills have been significantly reduced in recent years. The steel industry has been working with provincial and federal governments to identify potentially harmful substances and reduce or eliminate their emissions into the environment. In Ontario, for example, the industry has collaborated actively in the following programs:

- the Municipal Industrial Strategy for Abatement (MISA), a program for reducing or eliminating contaminants from water discharges
- the Canada-Ontario Agreement for site remediation
- the National Pollutants Release Inventory, a program under the *Canadian Environmental Protection Act* requiring submission of emission data
- the Pollution Prevention Pledge Program, a provincial voluntary commitment
- ARET (Accelerated Reduction or Elimination of Toxics), a federal voluntary commitment.

Further improvements are planned, particularly in curtailing the release of substances deemed to be toxic.

The federal government, through the *Canadian Environmental Protection Act* (CEPA), recently identified 16 such substances that are released, produced or used by steel mills, including polychlorinated biphenyls (PCBs), dioxins and furans. Most of these emissions come from coke ovens and blast furnaces that also release into the air substantial quantities of carbon monoxide, carbon dioxide, sulphur dioxide, nitrous/nitric oxide and various particulates.

The federal government is seeking to improve the management of these substances largely through the use of the Strategic Options Process (SOP). The steel SOP is a consultative process, with representatives from industry, federal, provincial and municipal governments as well as non-government organizations participating in the development of a plan to deal with these substances effectively. The end result of the SOP will be the development of a "Strategic Options Report" (SOR) containing recommendations to the ministers of the Environment and of Health and Welfare, to be submitted by the end of 1996. The recommendations will deal with the most cost-effective control options to reduce releases of (and exposure to) these substances and the best means and timing to implement these options.

"From the environmental perspective, it takes the wood from between 40 and 50 trees of one foot diameter to frame a 2000 sq. ft. house. That same house can be framed with the steel recycled from about six scrapped cars."
— John Mayberry, President and CEO, Dofasco, *Annual Report*, 1995

Pollution abatement and increased efficiency go hand in hand

Improvements include . . .

recycling . . .

reducing energy use by 25% . . .

treating effluent and reducing gas emissions

The Canadian industry recognizes that responsible environmental performance can go hand in hand with increased operating efficiency. Some significant improvements have been made, such as the following:

- Building recycling into the steelmaking process: gases and dust particles from smelting and refining are captured at most facilities and used as feedstocks or by-products.
- Increasing the use of recycled steel in the steelmaking process: today every tonne of steel produced in Canada represents over half a tonne of recycled steel.
- Significant improvements in energy consumption: total energy consumption by the Canadian steel industry is down by over one quarter, while energy per finished tonne is down 28 percent compared with the 1980s.
- Treatment of water effluents and air quality: water is returned to the Great Lakes from steel mills cleaner than when originally drawn; carbon dioxide emissions are down 30 percent since 1980.

A number of Canadian companies have also made significant investments in pollution control technologies. For example, Dofasco is spending $5 million on an emission control technology designed to reduce benzene emissions from coke-making facilities, and Stelco has installed a pulverized coal injection facility at its Hilton works in Hamilton, Ontario, that has the by-product effect of reducing coke oven emissions.

A detailed comparison of Canadian and U.S. environmental expenditures is not possible, as industry-wide Canadian statistics are not currently available.

4.5 Demand Outlook

Although raw steel production grew by a healthy 6 percent per year between the end of the Second World War and 1974, growth in both consumption and production has moderated considerably in the last 20 years. Despite occasional improvements in demand, the longer-term outlook remains one of slow market growth, typical of a mature industry. The anticipated growth in capacity and demand will occur mainly in Asia and other developing regions. However, North America will remain among the largest and most lucrative markets in the world for the foreseeable future.

Investment and competitiveness essential to Canadian steel

The modest growth expected in this market will continue to provide opportunities for competitive steel companies. An essential requirement for a successful steel industry in Canada is to maintain a continuous flow of investment in facilities, technology and people. Industry Canada is working with the steel industry and other stakeholders to ensure an investment climate that will encourage transnational companies serving a North American market to make further investments in Canada.

Key factors include:

The key factors for future competitiveness of the Canadian steel industry are as follows:

market access . . .

- maintaining access to the North American steel market

customer orientation . . .

- moving from production focus to market/customer focus

enhanced productivity . . .

- enhancing the productivity of people through training in skills and management

reduced production steps

- reducing the steps in the production process — integration of steps to create continuous flow — increasing yield and uniformity of the product.

4.6 The Bottom Line

The steel industry has undergone a significant transformation in recent years. From a production-oriented approach, the industry has had to become more customer-focussed. This has meant significant changes to product quality, customer service, distribution methods and even corporate organization. Much of this change has also resulted in large gains in productivity, due largely to technological advances and a commitment to progressive management/labour relations.

The Canadian steel industry consists of modern facilities and a highly productive work force. These factors and the close proximity to the lucrative U.S. market have helped to provide Canada with one of the world's most competitive steel industries.

Future of Canada's steel industry depends on . . .

market access . . .
new investment . . .
environmental issues . . .
borrowing rates . . .
interprovincial trade . . .
customer satisfaction

A number of issues are particularly important to the future of Canada's steel industry. These include:

- maintaining unimpeded access to the U.S. steel market
- ensuring that Canada is the NAFTA investment location of choice for steel
- meeting environmental responsibilities without becoming non-competitive
- sustaining reasonable borrowing costs for capital investment
- removing interprovincial barriers to trade
- continuing to adapt to a customer-driven market.

These key issues will be the subject of consultation between Industry Canada, steel manufacturers and other stakeholders. The outcome of the discussions may lead to a *Framework for Action* document.

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